

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures Under Control

Facility Name: Hewlett Packard
Facility Address: 1501 Page Mill Road, Palo Alto, CA 94304
Facility EPA ID #: CAD009122532

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 x If yes - check here and continue with #2 below.

 If no - re-evaluate existing data, or

 If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be “contaminated”¹ above appropriately protective risk-based “levels” (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	x			TCE (8,100 ppb max.), 1,1 DCE (120 ppb max.), 1,1 TCE, vinyl chloride (13 ppb max.), BTEX (4300 ppb benzene max) - all data from monitoring report first quarter 2000
Air (indoors) ²			x	possible but undetermined
Surface Soil (e.g., <2 ft)		x		Soils have been cleaned up by removal
Surface Water		x		Closest surface water is Matadero Creek approximately one quarter mile away (southeast)
Sediment		x		none
Subsurf. Soil (e.g., >2 ft)	x			Soils have been largely cleaned up by removal and SVE system; max VOC concentration remains in limited areas (1529 ppm) (the target cleanup level is 1 ppm)
Air (outdoors)		x		na

_____ If no (for all media) - skip to #6, and enter “YE,” status code after providing or citing appropriate “levels,” and referencing sufficient supporting documentation demonstrating that these “levels” are not exceeded.

_____ X If yes (for any media) - continue after identifying key contaminants in each “contaminated” medium, citing appropriate “levels” (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter “IN” status code.

Rationale and Reference(s):

Ground water is found at approximately 25 feet below ground surface(bgs). The geology beneath the facility is complex, based upon the presence of an anticlinal structure. Significant onsite and offsite ground water extraction and treatment systems are operating and have reduced ground water contamination below this facility.

Solvent contaminated soil generated by past manufacturing activity has been significantly cleaned up, using direct removal and soil vapor extraction (SVE). There are currently ground

¹ “Contamination” and “contaminated” describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based “levels” (for the media, that identify risks within the acceptable risk range).

² Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

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water extraction wells as well as an SVE system in operation. Both surface and subsurface soils onsite will be remediated to the 1 ppm level through the ongoing contaminant removal. The project manager believes that current subsurface soil residual concentrations are as high as 1529 ppb total VOCs (volatile organic compounds) on site.

Indoor air contamination may exist but has not been measured or confirmed.

The closest surface water is Matadero Creek (one quarter mile from the facility). This surface water is not being contaminated by this facility.

Outdoor air is not contaminated as a result of environmental releases from this facility.

References

Quarterly Ground Water Self Monitoring Report, First Quarter 2000, 1501 Page Mill Road Site, Palo Alto CA, April 27, 2000, Secor.

Human Health Risk Assessment for Soil (Revised), 1501 Page Mill Road Site, Palo Alto CA, May 30, 2000, Secor.

Memo: from Roger Brewer, RWQCB, to Brett Stevens, RWQCB, July 24, 2000, Review of Risk Assessment for Hewlett Packard , 1501 Page Mill Road, Palo Alto, CA.

Five Year Status Report and Effectiveness Evaluation , Two Volumes, 1501 Page Mill Road Site, Palo Alto CA, February 14, 2000, Secor.

Order 94-099 Revised Site Cleanup Requirements for 1501 Page Mill Road Site, Palo Alto, CA, August 17, 1994.

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3. Are there **complete pathways** between “contamination” and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

“Contaminated” Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ³
Groundwater	no	no	no	no			no
Air (indoors)	no	?	?				
Soil (surface, e.g., <2 ft)	no	no	no	no	no	no	no
Surface Water	no	no			no	no	no
Sediment	no	no			no	no	no
Soil (subsurface e.g., >2 ft)				yes			no
Air (outdoors)	no	no	no	no	no		

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors’ spaces for Media which are not “contaminated” as identified in #2 above.
2. enter “yes” or “no” for potential “completeness” under each “Contaminated” Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential “Contaminated” Media - Human Receptor combinations (Pathways) do not have check spaces (“___”). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter “YE” status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

X _____ If yes (pathways are complete for any “Contaminated” Media - Human Receptor combination) - continue after providing supporting explanation.

_____ If unknown (for any “Contaminated” Media - Human Receptor combination) - skip to #6 and enter “IN” status code.

Rationale and Reference(s):

Ground water is at approximately 25 feet below surface level. There is no domestic or commercial use of ground water in this area. Ground water does not discharge to surface water at Matadero Creek. There are no complete exposure pathways for ground water.

³ Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

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Indoor air contamination may exist onsite and offsite, due to the presence of positive soil vapor pressure from highly contaminated soil and shallow ground water .

Surface and subsurface soil contamination are being remediated by removal action or by use of a soil vapor extraction (SVE) system. The action level of 1 ppm in subsurface soil has not yet been reached, but should be reached in the future. However, there are still areas of highly contaminated soil that remain, e.g. 1529 ppb total VOCs. For the subsurface soil media, only construction workers have the potential for exposure.

Surface water in Matadero Creek (approximately one quarter mile away) is not contaminated by environmental releases from this facility.

There are no residents on the facility. There are deed restrictions at the facility that require notification of the RWQCB prior to excavation or use of soil or ground water.

References

See #2

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4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **“significant”**⁴ (i.e., potentially “unacceptable” because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable “levels” (used to identify the “contamination”); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable “levels”) could result in greater than acceptable risks)?

_____ If no (exposures can not be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

_____ If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

 X If unknown (for any complete pathway) - skip to #6 and enter “IN” status code
Rationale and Reference(s):

Review staff feel that there is no unacceptable risk to construction workers for limited exposures to subsurface soil because: 1) there is a deed restriction on this facility that requires notification of the RWQCB before construction commences and requires a risk assessment for the activities, 2) potential exposure will be of a short duration, and 3) the soil concentrations have diminished significantly and will continue to diminish in the future with continued operation of the SVE system.

Indoor air (potentially contaminated with VOCs from contaminated subsurface soil only) was considered for both onsite and offsite in the above referenced health risk assessment. The health risk assessment listed above (page 5-2) states that risks for a hypothetical residential exposure to children living on site is acceptable. However, RWQCB toxicologist Roger Brewer, in a memo dated July 24, 2000, states that: 1) the above mentioned health risk assessment did not consider convective flow of vapors in soil, 2) equations and parameters were not adequately presented or discussed, and 3) that they did not consider vapor generation from highly contaminated ground water. As such, there is a possibility that indoor air could pose a significant risk to onsite workers, or day care (if there was to be a day care on this facility) and off site residences that are located approximately 400 feet from the facility boundary.

References

See #2

⁴ If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

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5. Can the “significant” **exposures** (identified in #4) be shown to be within **acceptable** limits?

_____ If yes (all “significant” exposures have been shown to be within acceptable limits) - continue and enter “YE” after summarizing and referencing documentation justifying why all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

_____ If no (there are current exposures that can be reasonably expected to be “unacceptable”)- continue and enter “NO” status code after providing a description of each potentially “unacceptable” exposure.

_____ If unknown (for any potentially “unacceptable” exposure) - continue and enter “IN” status code

Rationale and Reference(s):

References

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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA750) Migration of Contaminated Groundwater Under Control

Facility Name: Hewlett Packard 1501
Facility Address: 1501 Page Mill Road, Palo Alto, California 94304
Facility EPA ID #: CAD 009122532

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

 X If yes - check here and continue with #2 below.
 If no - re-evaluate existing data, or
 If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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2. Is **groundwater** known or reasonably suspected to be “**contaminated**”⁵ above appropriately protective “levels” (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

 X If yes - continue after identifying key contaminants, citing appropriate “levels,” and referencing supporting documentation.

 If no - skip to #8 and enter “YE” status code, after citing appropriate “levels,” and referencing supporting documentation to demonstrate that groundwater is not “contaminated.”

 If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

Groundwater at the facility is contaminated with trichloroethene (8100 ug/L, well MW-048), 1,1-dichloroethene (120 ug/L, well MW-150), benzene (4300 ug/L, well MW-150), toluene (4700 ug/L, well MW-150) and total xylenes 3100 ug/L, well MW-150). Groundwater is first encountered at a depth of 25 feet and flows to the northeast and southwest. The divergent groundwater flow is due to the geological anticline beneath the facility.

ug/L - micrograms per liter (equivalent to parts per billion)

References

Quarterly Groundwater Self-Monitoring Report, First Quarter 2000, 1501 Page Mill Road Site, Palo Alto, California, April 27, 2000, Table 3-7, pg.1 and pg.3.

⁵ “Contamination” and “contaminated” describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate “levels” (appropriate for the protection of the groundwater resource and its beneficial uses).

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within “existing area of contaminated groundwater”⁶ as defined by the monitoring locations designated at the time of this determination)?

 X If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the “existing area of groundwater contamination”²).

 If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of groundwater contamination”²) - skip to #8 and enter “NO” status code, after providing an explanation.

 If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

Groundwater contamination has been stabilized with a pump and treatment system combined with source removal and soil vapor extraction. Due to these efforts, the groundwater contamination plume has been reduced in size.

References

Five-Year Status Report and Effectiveness Evaluation, Volume I of II, Hewlett-Packard Company, 1501 Page Mill Road Site, February 14, 2000, ES-1 - ES-4.

⁶ “existing area of contaminated groundwater” is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of “contamination” that can and will be sampled/tested in the future to physically verify that all “contaminated” groundwater remains within this area, and that the further migration of “contaminated” groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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4. Does “contaminated” groundwater **discharge** into **surface water** bodies?

_____ If yes - continue after identifying potentially affected surface water bodies.

 X If no - skip to #7 (and enter a “YE” status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater “contamination” does not enter surface water bodies.

_____ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

According to the project manager, contaminated groundwater does not discharge into surface water. The closest surface water is a creek located about a quarter mile from the facility. The groundwater contamination is focused on-site and has not migrated to the creek.

References

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5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration⁷ of each contaminant discharging into surface water is less than 10 times their appropriate groundwater “level,” and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

_____ If yes - skip to #7 (and enter “YE” status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration³ of key contaminants discharged above their groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

_____ If no - (the discharge of “contaminated” groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration³ of each contaminant discharged above its groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations³ greater than 100 times their appropriate groundwater “levels,” the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter “IN” status code in #8.

Rationale and Reference(s):

References

⁷ As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

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6. Can the **discharge** of “contaminated” groundwater into surface water be shown to be “**currently acceptable**” (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented⁸)?

_____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site’s surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,⁹ appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment “levels,” as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____ If no - (the discharge of “contaminated” groundwater can not be shown to be “**currently acceptable**”) - skip to #8 and enter “NO” status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

_____ If unknown - skip to 8 and enter “IN” status code.

Rationale and Reference(s):

Reference

⁸ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

⁹ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

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7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”

 X If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the “existing area of groundwater contamination.”

 If no - enter “NO” status code in #8.

 If unknown - enter “IN” status code in #8.

Rationale and Reference(s):

Groundwater monitoring is required by San Francisco Bay Regional Water Quality Board Order 94-099 signed August 17, 1994.

References

Order 94-099, Revised Site Cleanup Requirements for: Hewlett Packard Company 1501 Page Mill Road, Palo Alto, Santa Clara County, Stanford University, Palo Alto, Santa Clara County, signed August 17, 1994

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- IN - More information is needed to make a determination.

Supervisor (signature) (see attached signature page) Date _____
(print)
(title)
(EPA Region or State)

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